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or washed bright

P. M. #468

MEANS OF INCREASING PUFFABILITY OF BURLEY STEMS

Mr. John D. Hind of the Research and Development Department of Philip Morris Incorporated, on December 10, 1965, disclosed to me the results of his investigation on improving the puffing of tobacco stems.

One means of converting tobacco stems to a form which can be used in smoking articles such as cigarettes begins with the subsection of the stems to some form of energy such as heat, which causes the stems to expand or puff. When stems from bright tobacco are heated in this way, they become flexible and subsequently puff; however, when stems from burley tobacco are heated in the same way, they soften only slightly and puff feebly or not at all; when water-washed bright or burley stems are heated, they remain brittle and do not puff. Mr. Hind's invention makes it possible to cause stems from burley tobacco, or washed stems from bright tobacco, to puff in the desired manner.

Mr. Hind's invention comprises a process of impregnating the stems with a solution containing water-soluble carbohydrate together with citric acid and/or certain salts, and drying them. The stems then will soften and puff in a satisfactory manner when heated in the usual way. This treatment will very probably improve the puffing of burley stems in other puffing processes, such as microwave treatment or radiant energy. It is of course possible to extract a solution containing the necessary components (sugars and tobacco salts) from tobacco, preferably bright tobacco or the like; such a solution (e.g. from tobacco scraps) could be used to impregnate the stems.

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Mr. Hind's invention may be illustrated by the following examples.

Example 1

A solution having a pH of 5.3 and containing approximately 25% solids was prepared by mixing the following ingredients in the order listed, while the mixture was heated to about 50°C:

Water	150 g
"Nulomoline" 80% invert sugar syrup	50
Magnesium sulfate heptahydrate	10.7
Citric acid	6.0
Malic acid	40.0
Monobasic potassium phosphate	7.2
Aqueous ammonia, 30% NH_3	2.0
Calcium chloride	7.0
Potassium hydroxide dissolved in 153 g water	31.4
Water	222

This solution was clear and stable at room temperature for more than a week. If not stabilized, it will eventually support a surface growth of mold.

Washed burley and bright tobacco stems were soaked for 12 to 24 hours in this solution and dried at room temperature. They absorbed approximately their own weight of soluble materials. When dry, the stems were heated on a hot plate and all expanded or puffed in a satisfactory manner. The same washed and dried stems without impregnation failed to puff when heated in the same way. The puffed stems could be sliced or other wise broken up, or used without further treatment, and when they were combined with tobacco leaf a blend resulted which in a cigarette gave a satisfactory and pleasing smoke.

The puffed stems had excellent filling power, that is, a large bulk volume as compared with shredded leaf. This property makes the product economically attractive.

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Example 2

Burley tobacco stems, washed to a very low water soluble content and dried showed no tendency to puff. A batch of these stems was separated into four 10-g. portions and each was immersed in a solution containing 150 g of water and 50 g of solute as shown, for 22 hours:

- Sample a) Sucrose
- Sample b) Sucrose, 4 parts + citric acid monohydrate, 1 part
- Sample c) Sucrose, 4 parts + potassium chloride, 1 part
- Sample d) Sucrose, 4 parts + calcium chloride, 1 part

The uptake of additive was calculated on a dry basis from the wet weight of stems after removal of excess liquid, and is reported as per cent of total weight: Sample a) 51.2%, b) 53.4%, c) 52.8%, d) 47.3%. The impregnated stems were air-dried 72 hours at 77°F and 60% relative humidity and tested for puffing on a hot plate maintained at about 450°F. All samples showed some puffing activity, rated as follows:

- Sample a) Very slight
- Sample b) Moderate puffing, moderate rate
- Sample c) Good puffing, somewhat slower than unwashed bright stems
- Sample d) Very slight, quite slow.

Other sugars or soluble carbohydrates such as glucose, fructose, dextrin, and the like will serve as replacements or in conjunction with the sugars mentioned. Salts containing ions commonly found in tobacco, and organic acids of tobacco, are useful in supplementing the carbohydrates, some more so than others: KNO_3 , NaCl , K_2HPO_4 , CaCl_2 .

The results of any further development on this process for increasing the puffability of stems, will be reported and shall become a part of this disclosure.

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